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BY JOHN D. MANLEY

How to predict tool life

A benchmark, as defined by Webster's dictionary, is "something that serves as a standard by which others may be measured or judged."

The practice of establishing benchmarks for cutting tool implementation is changing. These standards are typically set by the machine tool operator and are accepted as dynamic throughout a component's production life. In this Tech Talk we will explore the benefits of "forward" versus "reverse" benchmarking.

Traditionally, manufacturers had tool cribs, where the machine operator sought out the correct tool for the job. By experience, as well as trial and error, the operator figured out the process and improved upon it over time. The trouble was, cutting tools had inconsistencies and this created a variable that the operator could only compensate for by using conservative speeds and feeds.

As tooling progressed, standards developed, allowing tool engineers to provide consistent geometries to manufacturing. The only hiccup in this development has been the pressure applied by shareholders to continuously cut costs. Consequently, many different types of cutting tools entered each production facility, admittedly due to well-intentioned purchasing departments with cost-cutting agendas. Unfortunately, these decisions were often based upon catalog specifications, reflecting only the cutting tool cost, not the true operating costs of the process over its life. A prime example of these variances is the S-point drill, which is made by many manufacturers, each claiming to be the leader in the field. But not all of these drills will perform the same way in the same application. Some drills might fail, for example, due to a simple edge-honing variance. These idiosyncrasies are difficult to judge from an office.

Today, the tool engineer's role has been complemented or, more commonly, replaced by outsiders, or tool management houses (TMH). Again, well intentioned, the TMH is driven by purchasing to keep costs at bay. Consequently, new tool manufacturers are constantly introduced to programs. What is unfortunate is that the manufacturers are often far away from the battle lines, hence tool geometry optimization is seldom possible.

What generally happens is a new cutting tool enters production, the operator learns its limitations and he quickly develops a benchmark for speeds, feeds and number of hits. As time passes, the tool meets this benchmark time and time again, until one day a tool fails. Whatever the reason for failure, the operator develops a new expectation or benchmark for the tool's performance, perhaps 95% of its original capability. The repetition of this benchmarking is referred to as "reverse benchmarking" and can rapidly degrade to 80% productivity after three or four iterations. Slowly eroding productivity, reverse benchmarking can quickly wipe out profitability.

"Forward benchmarking," on the other hand, seeks to establish benchmarks through a marriage of supplier, management and operators, where tool life expectations are established up front. The performance of the tool is constantly monitored for methods of improvement. Through detailed documentation, the supplier and customer work toward continuous improvement of speeds, feeds and hits. By using CNC-cutter-grinding techniques, very slight tweaks in the following tool specifications are practical: customized clearance angles, honed-edge widths, flute forms and polishing techniques.

The challenge with forward benchmarking is having consistency and control over these very slight changes. Such control is greatly simplified by having local tooling sources, where plant floor visits provide the feedback of each tool's performance. Metalworking manufacturers can benefit from partnering with local tool makers. By introducing such accountability to both tooling procurement and tool utilization, Canadian manufacturers will generate unprecedented savings. ◼ CMM

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